right tibia and fibula, were exposed to view. The hair and scalp were burnt off the forehead, exposing the bare and calcined skull. The tissues of the face were represented by a greasy cinder, retaining the cast of the features, and the incinerated mustache still gave the wonted military expression to the old soldier. The soft tissues were almost entirely consumed. On my return from other work, later on, I found that the whole had been removed. The bearers told me that the whole body had collapsed when they had tried to move it *en masse*. From the comfortable recumbent attitude of the body, it was evident that there had been no death-struggle, and that, stupefied with all the whiskey within and the smoke without, the man had expired without suffering, the body burning away quietly all the time."

THE SUPPRESSION OF SMALL-POX. — An outbreak of small-pox is reported to have occurred recently in Minneapolis, and the health-officer of that city is credited with having summarily and successfully dealt with it. According to *The Journal of the American Medical Association*, as soon as a case was announced, a consultation was called to determine if the disease was small-pox. That being settled, the patient was removed to the quarantine hospital for treatment. The house where he lived was quarantined, and all the people directly exposed were confined in it. Dr. Kilvington's assistants then began to look up all people indirectly exposed, and vaccinated them. Quarantine houses had guards stationed about them, who allowed no one to go in or out during the season of quarantine. The quarantine people were vaccinated, and during the time until it could be determined whether the vaccination would take, they were supplied with food. When the vaccination took, the person under quarantine was bathed, given new clothing in the place of the old, which was burned, and he was then discharged. When a house had been emptied of people under quarantine, the bedding and curtains were burned, sulphur burned in all the rooms, and the walls sprayed with corrosive sublimate. None of the inspectors or guards were allowed to enter any of the houses under quarantine, when there was danger; and *the doctors that did the vaccinating saturated their clothing with the corrosive sublimate before and after entering a house where there had been small-pox*. The clothing and bedding were either paid for at a reasonable price by the board of health, or were replaced by new articles. In one of the houses quarantined, *there were 31 laboring men who were inclined to object to the rules of quarantine*. One escaped, but he was taken back when found, *and a guard, with a rifle and instructions to shoot* should he attempt to escape, was put over him. Since Jan. 13, six thousand people have been vaccinated, and the schools, public and private, have been systematically visited, and unvaccinated children vaccinated. The absurdity of saturating the clothing of the vaccinators before and after entering each house where there had been small-pox is self-evident. Nor do we believe that in this enlightened age any guard would be instructed by a health-officer to shoot a laboring man who, after being shut up forcibly in a house where a case of small-pox had been, should attempt to escape, especially when the house had been disinfected, and the man himself vaccinated. The account above given must, we think, have been obtained from some source outside the health-office of Minneapolis.

ELECTRICAL NEWS.

Canal-Boat Propulsion.

A PAPER read by Mr. H. C. Vogt at the last meeting of the British Association for the Advancement of Science brought out some interesting and remarkable facts. It gave the results of some experiments made with air-propellers at Copenhagen. A steam-launch was fitted with a windmill with steel blades, carried on a frame above the deck, and provided with steam machinery to rotate it. The *London Electrical Review*, in describing the experiment and suggesting a modification of the method, says that at first sight the method would seem an extremely inefficient one as regards application of power to so unstable a medium as the air; but when it is remembered that recent investigations of the marine propeller have established it as a true re-action engine, in which a large slip is not necessarily an accompaniment of inefficiency, it will appear that there is nothing wrong in the principle indicated by Mr. Vogt. An air-propeller is a pure momentum or re-action machine. Practically it was found that a twenty-foot launch of five and a half feet beam could be driven at a speed of five knots per hour in calm weather, and against a fresh breeze at four knots. The engine producing this effect indicated one and one-half horse-power. For a single indicated horse-power, the thrust of the propeller was 36.7 pounds, or about the same as a water-propeller. It might be supposed that in a contrary wind this thrust would disappear; but, on the contrary, through 75 per cent of the horizon the thrust was found to be augmented by the wind. With a larger launch, having a displacement of five tons, a speed of over six knots an hour was obtained, against the wind. In some of the trials, canvas-covered wings were used, but they were found inferior to steel.

To replace the steam-engine used in these experiments, the *Review* suggests an air-propeller carried well above the decks on a standard, driven by an electric motor which is carried on top of the frame, supplied with current from a wire running along the canal, and connected with the motor through flexible conductors and a carriage travelling on the main wire. The blades of the propeller should be of steel, accurately shaped, and arranged to be turned at a greater or less angle according to the direction of the wind. Thus equipped, a canal-boat could make her way with a speed exceeding that generally used, and with no greater proportionate expenditure of power than that existing in all cases where the trolley system of actuating electric motors is in use.

The advantages of the system are obvious. The hull of the vessel would be entirely clear of machinery, and the entire weight of the propelling apparatus carried by the boat need not exceed that of an ordinary tow rope. No disturbance of the water of the canal would be produced, except such as would be due to the progressive movement of the hull of the vessel. It would seem as though in this suggestion might be found a solution of the mechanical driving of canal-boats, — one that, from the points of view of simplicity, non-occupancy of the hull of the boat, and minimum disturbance of the water, would be nearly perfect.

The air-propeller works with an entire absence of vibration. It requires ten or twelve times the area of the corresponding water-screw. As the thrust is a perfectly quiet one, and, if due to the motion derived from a dynamo, would be free from the jarring inseparable from the motions of a heavy reciprocating engine, and as it is cushioned in all its motions by the high elasticity and mobility of the air, a very light frame would serve to carry the wheel. A thrust of 75 to 150 pounds would be all that the frame would be required to resist, — a thrust that would always be brought on it gradually, and would be gradually released. In steam canal boats a very considerable portion of the hull is occupied by the engine, boilers, and coal-bunkers, while the constant eddies and currents produced by the propeller are destructive in their effect on the sides and bottom of the canal. This is all done away with in aerial propulsion. The establishment of a line of poles and wire would not represent the tithe of the cost of a fixed or travelling towing-cable.

INFLUENCE OF LIGHT ON MAGNETISM. — A preliminary notice of a very interesting experiment has been given by Mr. Shelford Bidwell. The investigation was undertaken to determine whether a piece of iron could be magnetized by allowing a ray of light to fall on it. Of course, if light is an electrical vibration, and if an effect was sought using an ordinary piece of iron, there would be no result, since the opposite vibrations would exactly neutralize each other's effects. But iron can be prepared so that it is more susceptible to a magnetic force acting in one direction than to one acting in the other. Ewing has shown, that, if a piece of iron which is being magnetized in what we call the positive direction has the magnetizing current reduced to zero at such a point in the operation that the current and the magnetization of the iron become zero at the same instant, then that piece of iron, although apparently in a neutral condition, is more susceptible to a negative than to a positive magnetizing force. So, if a piece of iron prepared in this way be submitted to the action of a ray of light, the positive and negative magnetizing forces produced, although equal, will not balance with one another, but the latter should produce an effect. On trying the experiment in this way, Mr. Bidwell ob-

tained a sudden throw of the magnetometer-needle, denoting the magnetization of the iron, followed by a slower motion due probably to the heating effect of the light. While Mr. Bidwell does not consider the results as altogether free from suspicion until all possible disturbing causes have been eliminated, yet, if further research confirms the results already arrived at, the experiment is most important. The last year has added many proofs of the fact that light is an electro-magnetic disturbance, but none are so conclusive as this would be.

THE PURIFICATION OF SEWAGE.—Last year we described the plan proposed by Mr. W. Webster for the purification of sewage by electrolytic methods. It has been since tried on a large scale, and with encouraging results. The process is very simple, and is described by the *London Electrician* as follows: "The color, density, and constitution of the London sewage varies from hour to hour in the most extraordinary manner; but the first sample to be dealt with was of a light-yellow color, looking something like weak tea with a little milk in it, but, so far as could be seen, it contained very little solid matter in mechanical suspension. This having been poured into a test-jar, a current was passed through it between a pair of iron electrodes, with about six volts electromotive force. An extremely rapid effect was produced. In less than two minutes the jar was seen to be filled with a flocculent precipitate, which was gradually carried upward by the bubbles of liberated hydrogen. After about three minutes, the electrodes were withdrawn, and the precipitate left to collect at the top. In actual practice, after the effluent has passed into the settling-tank, the precipitate, in the course of about two hours, loses the whole of the entangled hydrogen; it then sinks to the bottom of the tank. The sludge thus formed is similar to that produced by the chemical processes now in use, except that the electrical method possesses the obvious advantage that the total quantity of material has not been increased by the addition of chemicals." But, besides this precipitation, there is an action on the organic matters in solution which robs them of their unpleasant and harmful properties. In the larger experiments carried on at Crossness, two 20-horse-power engines are used, with an Edison-Hopkinson dynamo. Iron plates are placed in the shoot through which the sewage is discharged. In travelling along the shoot, every particle of the sewage comes in contact with the plates, and finally the whole is received into the settling-tanks. With 27 horse-power, it is possible to treat a million gallons of sewage in twenty-four hours. The consumption of iron in actual working is about two grains per gallon. Taking a town with a daily flow of ten million gallons of sewage a day, — corresponding to a population of about 300,000, — the consumption of iron should not exceed 304 tons per annum, and the steam-plant required would be about 250. This plant takes the place of the mixing-tanks, machinery, and chemicals employed in the chemical process for the purification of sewage; and, if such electrical plant is designed to meet the peculiar requirements of the district, it should cost less than any other method, besides precipitating and purifying in one operation.

SECONDARY BATTERIES. — We are informed that in the United States Circuit Court, April 9, Judge Coxe approved of the disclaimer filed by the Electrical Accumulator Company, and formulated the decree and injunction restraining the Julien Electric Company, their officers, agents, and workmen, from further manufacture, use, or sale of secondary batteries of the Faure type, in which the active material is applied to the support in the form of a *paint, paste, or cement.*

NOTES AND NEWS.

THE "Atlantic Pilot Chart for April" says of whirlwinds, water-spouts, and tornadoes, that these phenomena are of the same general character; and it has been found, that, whenever they occur, it is in connection with a general cyclonic storm of large area. The principles involved in their formation are almost identical with those that determine the formation of a tropical cyclone; that is, great contrasts of temperature and moisture between adjacent layers of air. In the United States and off our coasts they may therefore naturally be expected to occur to the southward of a storm-centre, where cold, dry northerly winds blow over and mingle with warm moist air from the southward. That they may occur to the north of a storm-centre, however, under certain conditions, is indicated by a report from Second Officer Madge, of the British steamship "Lake Winnipeg," Capt. Murray. This vessel encountered a severe cyclonic storm Feb. 27, latitude 40° 50′ north, longitude 56° 48′ west; and at 2.30 P.M., when it was blowing a strong gale from the east, a whirlwind was observed moving due west. The barometer was low, and the warm, moist east wind was evidently underrunning a cold, dry current of air from the area of high barometer to the northward, where readings of 30.4 inches and upward are reported. It will thus be seen that local conditions of pressure, temperature, and moisture may cause exceptions to the general rule.

— The lectures to the summer class in botany, of the College of Pharmacy of the City of New York, by Professor Joseph Schrenk, commenced Wednesday, April 10, and will be continued every Wednesday until the end of June. By request of several members of former botany classes, Professor Schrenk will also give a course in practical microscopy.

— The Essex Institute of Salem, Mass., was organized March 1, 1848, under a charter granted by the Legislature in February of that year, having for its objects the collection and preservation of whatever relates to the geography, antiquities, and civil and ecclesiastical history of Essex County; the formation of a cabinet of natural productions in general, and more particularly those of the county; the promoting a taste for the cultivation of choice fruits and flowers; its three departments then being history, natural history, and horticulture. The scope of the institute has been from time to time enlarged, and there are now departments of history, science, literature, art, and horticulture. The library of the institute, which in 1848 numbered fifteen hundred volumes, now numbers fifty-one thousand volumes, and embraces all the departments of literature, but is mostly useful for reference. A reading-room is the latest addition to the library department, and this is well supplied with historical, scientific, and art periodicals, besides the usual magazine literature of the day. The museum of the institute now contains a large and valuable collection of antiquarian and historical relics, portraits, paintings, engravings, medals, coins, paper currency, manuscripts, etc., and is in process of systematic arrangement. The scientific collections, which before 1867 had grown to be so large and of such value that it was impossible for the institute at that time to bear the expense of properly caring for and exhibiting them, were, by agreement entered into between the institute and the trustees of the Peabody Academy of Science in May, 1867, deposited with the last-named institution, where, properly labelled, arranged, and preserved, they are made available to the public, and form an attractive feature of the academy's museum at East India Marine Hall. The publications of the institute regularly issued are the *Historical Collections*, which have now reached Vol. XXV.; *The Bulletin*, which has reached Vol. XXI., and contains records of the regular meetings and field-meetings of the institute, and special papers on scientific subjects; the *Annual Report;* besides occasional monographs, etc. The rooms of the institute contain portraits of the officers of the Essex Historical and Essex County Natural History Societies, the forerunners of the institute; old prints; silhouettes; a great number of interesting relics; historical portraits by Copley, Smibert, Trumbull, and others; antique furniture; local relics; and military costumes. A fire-proof room holds the large and invaluable collection of manuscripts. The meetings of the institute are held on the first and third Mondays of every month. During the winter months, papers are read; and field-meetings are held throughout the county every summer for scientific and historical investigation and discussion. Without considerable endowments in the past, the institute has been able to do for the civil history and archæology of Essex County — and no other county in America offers a better field for such research — what has been so well done for the natural history of the county, a cherished object of the institute, by the well-equipped and earnest workers of the Peabody Academy of Science. With largely increased facilities and resources, which it owes to the general appreciation of its work, it is now ready to go forward, as